# STUDIES ON THE SYSTEMATICS AND DISTRIBUTION OF PRAWNS IN ASSAM[1]

N.K. DUTTA[2]

(*With nine text-figures*)

**Key words**: *Caridina weberi* de Man, *Macrobrachium altifrons* (Henderson), *M. assamensis* (Tiwari), *M. birmanicum choprae* (Tiwari), *M. dayanum* (Henderson), *M. lamarrei* (H. Milne-Edwards), *M. malcolmsonii* (H. Milne-Edwards)

The family Atyidae (Decapoda : Crustacea) of Assam has *Caridina weberi* de Man of the genus *Caridina* and eight species of the genus *Macrobrachium* namely *Macrobrachium altifrons* (Henderson), *M. assamensis* (Tiwari), *M. lamarrei* (H. Milne-Edwards), *M. malcolmsonii* (H. Milne-Edwards), *M. menoni* (Agarwal) and *M. tiwari* (Agarwal) of Family Palaemonidae recorded from different districts of Assam.

## INTRODUCTION

The biology and fishery of prawns has gained considerable attention, due to their great economic importance. Prawns are caught round the year. However, the peak catch shows a definite seasonal trend in commercially important prawn landing areas. In the north-eastern region of India in general and Assam in particular, the peak season is from September to February. Various authors reported on the taxonomy and distribution of freshwater, estuarine and marine prawns (Henderson and Matthari, 1910; Tiwari, 1947; Holthuis, 1950; Yaldwyn, 1955; Kunju, 1956; Holthuis and Roas, 1965; Yaldwyn, 1966; George, *et al.* 1968; Koshy, 1969; Yaldwyn, 1971, 1973; Agarwal, 1976). But in this context, there is little information on the freshwater prawns of Assam. In view of this, the present study was undertaken.

## MATERIAL AND METHODS

Prawns belonging to Family Atyidae and Palaemonidae were collected regularly in different districts of the state of Assam, and were obtained from fishermen's catches. They were brought to the laboratory, cleaned and preserved in 8-10% formaline.

[1]Accepted June, 1998

[2]Masjid Road, Natun Sarania,
Gandhibasti, Guwahati 3, Assam, India.

## RESULTS

The collection from Assam comprises of nine species.

***Caridina weberi*** de Man 1892.
(Fig. 1)

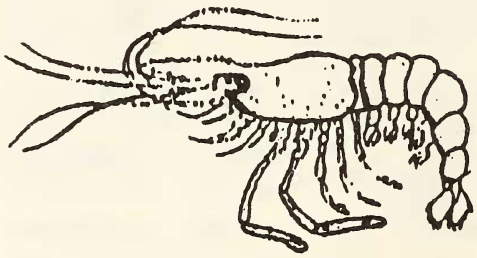

Fig. 1: *Caridina weberi* de Man

Collection localities; Goalpara district: Dipul beel, 1♂, 2♀, TL 18-20 mm; Kamrup district: Jalukbari and Kulsi, 2 ♂, 1♀, TL 15-24 mm; Nowgaon district: Kolong R., 2♂ d, 3 ♀, TL 15-17 mm; Sibsagar district: Namdang R. and Joysagar 4♂, 3 ♀, TL 17-18 mm.

Diagnostic features: Rostral formula (RF): 15-19/4; carapace pigmented. Apex of antennal scales, pointed to slightly oval; spines on the 5th peraeopod absent altogether, but spines present on the 3rd and 4th peraeopods. 1st peraeopod: carpus = chela, carpus > merus. 2nd peraeopod: merus = carpus, carpus > chela.

Maximum size 24 mm.

***Macrobrachium altifrons*** (Henderson)
(Fig. 2)

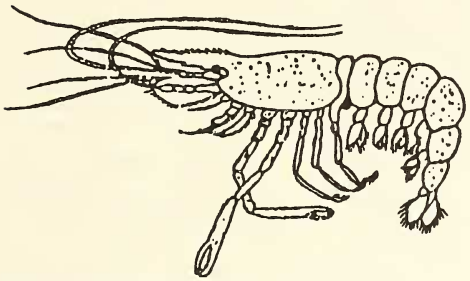

Fig. 2: *Macrobrachium altifrons* (Henderson)

Collection localities: Kamrup district: Sonapur, 2 ♂, 3 ♀, TL 43-46 mm.; Pandu, Maligaon, 8 ♂, 5 ♀, TL 44-47 mm; Goalpara district; Dhubri, 2 ♂, 3 ♀, TL 45-46 mm, Karbi Anglong district: Jamuna R., 2 ♂, TL 46 mm; Sibsagar district: Sibsagar market, 5 ♂, 6 ♀, TL 43-45 mm.

Diagnostic features: RF 10-12/3; Ant. scale pointed. Apex horizontal to slightly upturned, convexity starts after 1/3rd length of its origin; 3-4 teeth on carapace; teeth are sub-erect. 1st peraeopod: finger = 1/2 carpus; ischium, merus, palm and finger are hairy. 2nd peraeopod: unequal or subequal, palm ≥ finger, palm broader than carpus, 2-3 blunt teeth with 6 tubercles on immobile finger, but in mobile fingers 3-4 unequal teeth at irregular intervals. Cutting edge of mobile fingers with 4 tubercles instead of 5 or 6.

Maximum size 47 mm.

***Macrobrachium assamensis*** (Tiwari)
(Fig. 3)

Collection Localities: Kamrup district: Pagladia R. near Uttar Kuchi, Chowki and Nabasti, 1♂, 6♀, TL 40-76.2 mm; Baralia R. near Rangia, 40♂, 20♀, TL 42-73 mm; Kukurmara beel, 1♂, 9♀, TL 43-68 mm; Tihu, Boko near Soigaon, Houli near Barpeta, Kulsi R., Deeper beel near Jalukbari and Guwahati, 32♂, 23♀, TL 31-71 mm; Sibsagar district Namdang R. Gaurisagar, 50♂, 45♀, TL 51-77 mm; Dibrugarh district: Dilli R. near Namrup, Dibru R. near Rajgarh, 25♂, 36♀, TL 45-65 mm; Lakhimpur district. Dhokuakhana, 20♂, 15♀, TL 49-50 mm; Cachar district: Silchar, 5♂, 8♀, TL 42-45 mm.

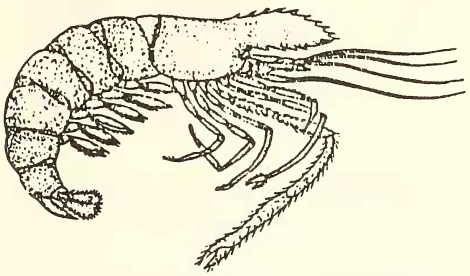

Fig. 3: *Macrobrachium assamensis* (Tiwarí)

Diagnostic features: RF 8-10/2-4; RL > Antennal scale. Antennal scale-oval, carapace highly pigmented. Wide gap between 1st & 2nd, 2nd & 3rd and 3rd & 4th teeth on dorsal edge of rostrum. Antennal scale somewhat conical to oval. 1st peraeopod: Carpus ≥ chela, Carpus > merus. 2nd peraeopod: merus ≥ carpus. Non-chelate leg: all segments hairy except merus; propodus = merus; 3 equal teeth on Im. F., and 1 large and 2 small teeth on M.F., apex of telson round to acute.

Maximum size 77 mm.

***Macrobrachium birmanicum choprae*** (Tiwari)
(Fig. 4)

Collection localities Kamrup district: Bijlee beel, 2♂, 1♀, TL 95-110 mm, Brahmaputra R. 5♂, 5♀, TL 85-165 mm, Darrang district: Jamuguri beel near Tezpur, Tezpur market, 10♂, 15♀, TL 69-165 mm; Sibsagar district: Dekhow R. 22♂, 33♀, TL 65-170 mm, Lakhimpur district. Dhokuakhana 5♂, 8♀, TL 84-100 mm; Dibrugarh district Brahmaputra R. near Assam Medical College,

24♂, 30♀, TL 79-167 mm; Cachar district: Karimganj 25♂, 24♀, TL 70-160 mm.

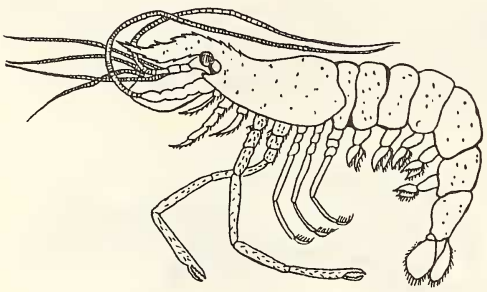

Fig. 4: *Macrobrachium birmanicum choprae* (Tiwari)

Diagnostic features: RF 11-12/4-5; Apex of antennal scales pointed; rostrum somewhat long depending on body size and protrudes in front of body, nearly reaching antennal scale. Carapace smooth in young ones, rough in adult and slightly pigmented. 1st peraeopod: exceeds Ant. scale by chela, 2/3rd of the carpus, carpus twice as long as chela, 2nd peraeopod: spinules larger only on undersurface of merus; ischium rod-like, not laterally grooved; merus = carpus > palm. One conical and one blunt tooth on M.F. with 4 to 5 tubercles. Apex of finger translucent.

Maximum size 170 mm.

***Macrobrachium dayanum*** (Henderson) (Fig. 5)

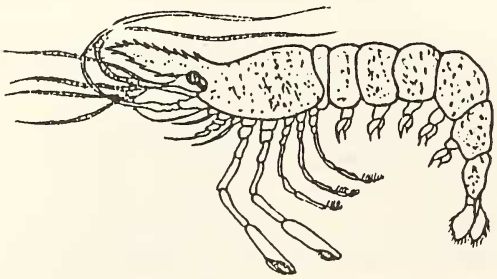

Fig. 5: *Macrobrachium dayanum* (Henderson)

Collection localities: Kamrup district: Pagladia R. Chowki & Naubasti, Raumari beel, Satdala beel, Rangagora near Changsari, Depargaon near Kumanadi R., Moranadi R. near Dimoo, Deeper beel near Guwahati, Kukurmara beel near Guwahati, Kapla beel, Boko near Soigaon, Jalukbari, Guwahati, Kulsi R. 37♂, 24 ♀, TL 26-92 mm; Darrang district: Jamuguri near Tezpur, Raumari beel, Mora Boroli R., Mongoldoi R. near Mongoldoi, Urang near Dhekiajuli, 21♂, 18♀ TL 41-71 mm; Nowgaon district: Jagiroad, 13♂, 20♀, TL 26-68 mm; Karbi-Anglong district: Kapili R., 2♂, 4♀, TL 55-69 mm; Cachar district: Kaliganj, Karimganj, Silchar proper, 22♂, 28♀, TL 35-55 mm; Sibsagar district: Longsai beel, Pohugar near Gaurisagar, Namdang R. near Kaloogaon, Ranganadi R., Janji R., Kakodunga R., 43♂, 35 ♀, TL. 18-89 mm; Lakhimpur district: Corella beel, 7♂, 9♀, TL 26-75 mm; Dibrugarh district: Namrup, Dibrugarh proper near Brahmaputra R., 22♂, 20♀, TL 39-68 mm; Lakhimpur district: Dhakuakhana 12♂, 9♀, TL 37-52 mm.

Diagnostic features: RF 7-11/5-9; apex of ant. scale pointed. Cavity-between first and second teeth on ventral edge of rostrum. Cervical sulcus moderately developed, gastro-orbital carina well developed, Carapace highly pigmented. 1st peraeopod: merus = ischium; ischium, merus, palm and finger hairy. 2nd peraeopod: palm ≥ finger, carpus = merus, ischium and palm-rod-like. Non-chelate legs: all segments hairy; ischium > carpus; Im. F. with 2-3 conical teeth having 7-8 minute spines. M.F. with 3 equal conical teeth having 5 minute spine-like processes.

Maximum size 92 mm.

***Macrobrachium lamarrei*** (H. Milne-Edwards) (Fig. 6)

Collection localities: Kamrup district: Pagladia R., Deeper beel near Guwahati,

Brahmaputra R. near Maligaon, Fancy Bazar, Guwahati, Bhalukmara beel, Kahikusi, Boko near Soigaon, Hatipara beel, Chetolijan near Nalbari, 21♂, 18♀, TL 21-55 mm; Goalpara district: Dipo R., Dhubri, 10♂, 70♀, TL 33-51 mm; Darrang district: Raumari beel near Tezpur, 7♂, 5♀, TL 36-42 mm; Nowgaon district: Nowgaon proper, 4♂, 10♀. TL 36-44 mm; Cachar district: Karimganj, Silchar proper, Chatla, Hawar beel, near Silchar, 36♂, 67♀, TL 35-65 mm.; Sibsagar district: Namdang R. near Kaloogaon, Bhougdoi R., Kakodunga R., Kaziranga 56♂, 40♀, TL 17-58 mm; Dibrugarh district: Dibgrugarh proper near Brahmaputra R., 50♂, 43♀, TL 40-57 mm; Lakhimpur district: Dhakuakhana, 10♂, 11♀, TL 18-30 mm.

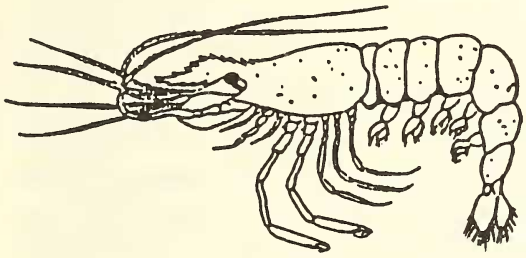

Fig. 6: *Macrobrachium lamarrei* (H. Milne-Edwards)

Diagnostic features: RF 7-11+4-8, carapace slightly pigmented. Apex of ant. scale slightly oval. Rostral length > Ant. scale, teeth on dorsal edge present throughout the rostrum; cervical sulcus well-developed, gastro-orbital carina (GOC) highly developed, adrostral sulcus not distinct. 3rd maxillipeds short, only base of dactylus hairy. 1st peraeopod: carpus = merus, finger = palm. 2nd peraeopod: merus > carpus. Ischium rod-like, Im. F. inwardly curved, teeth almost equidistant from each other. M.F.: 5 minute teeth. Carpus of second cheliped twice as long as chela. Chelate leg: teeth equidistant from each other.

Maximum size 65 mm.

***Macrobrachium malcolmsonii*** (H. Milne-Edwards) (Fig. 7)

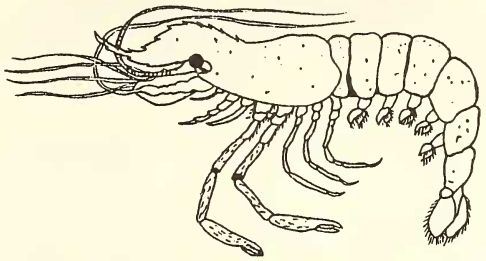

Fig. 7: *Macrobrachium malcolmsonii* (H. Milne-Edwards)

Collection localities: Kamrup dist: Brahmaputra R. near Maligaon and Fancy Bazar, Guwahati., 8♂, 7♀ , TL 36-60 mm, Darrang dist: Brahmaputra R. near Tezpur, Orang near DekiaJuli, 11♂, 9♀, TL 42-48 mm; Cachar dist: Fakira bazar near Bilchar, 12♂, 10♀, TL 45-58 mm; Sibsagar dist: Dekhow R., Bhougdoi R., 12♂, 10♀, TL 35-41 mm; Dibrugarh dist: Brahmaputra R., Naharkatia, 12♂, 13♀, TL 46-58 mm.

Diagnostic features: RF 8-11+1-3/4-7; apex of Ant. scale conical. Rostral length = antennal scale. On dorsal edge of rostrum, convexity starts behind orbit, becomes maximum above orbit, gradually declines, becomes straight and slightly upturned at the tip. 1st and 2nd proximal teeth and last two more widely spaced. 3rd maxilliped reaches 1/3rd of ant. scale, dactylus and carpus hairy. 1st peraeopod: ischium < chela. 2nd peraeopod: ischium < merus, merus > carpus, finger > merus. Non-chelate leg: dactylus and propodus hairy.

Maximum size 60 mm.

***Macrobrachium menoni*** (Agarwal) (Fig. 8)

Collection localities: Kamrup district: Deeper beel, 8♂, 5♀, TL 32-33 mm.; Goalpara district: Dipo,. 1♂, 1♀, TL 34-36 mm; Cachar district: Chatla Hawar beel, 8 km south of Silchar, 5♂, 3♀, TL 62-67 mm.

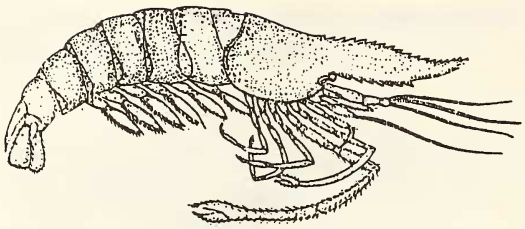

Fig. 8: *Macrobrachium menoni* (Agarwal)

Diagnostic features: RF 15-16/7-8; carapace slightly pigmented. Upper margin of rostrum with convexity just behind eye, concavity in front of eye; tip of rostrum horizontal or slightly inclined and lowered further. Ant. scale oval. 3rd maxilliped almost reaches tip of Ant. scale, carpus and dactylus hairy. 1st peraeopod: ischium=chela. 2nd peraeopod: merus < carpus, carpus twice the length of palm.

Maximum size 67 mm.

***Macrobrachium tiwari*** (Agarwal)
(Fig. 9)

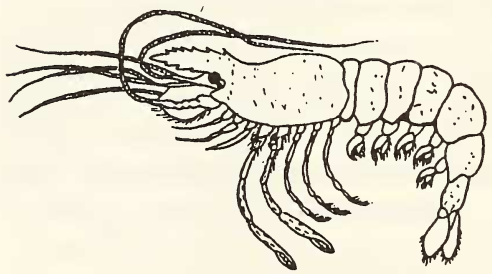

Fig. 9: *Macrobrachium tiwari* (Agarwal)

Collection localities: Kamrup district: Maligaon near Guwahati, 2♂, 3♀ TL 56-58 mm; Goalpara district. Dipol 2♂, 4♀, TL 32-33 mm,; Karbi-Anglong district: Jamuna R., 2♂, 1♀, TL 36-39 mm.

Diagnostic features: RF 5-7/2-5; Carapace slightly pigmented. Apex of ant. scale slightly oval. Rostral length > Antennal scale, wide gap between 4th & 5th, 5th & 6th rostral teeth and 6th & 7th rostral teeth, 3 teeth on carapace. Cervical sulcus highly developed, gastro-orbital carina moderately developed, adrostral sulcus less distinct. 1st peraeopod: carpus ≥ merus; propodus and dactylus hairy. 2nd peraeopod: carpus ≥ merus ≥ ischium, palm > finger. In Im. F. presence of tubercles with 3 equal teeth; 1-2 teeth on M.F. Non-chelate leg: 3rd, 4th, 5th propodus ≥ merus.

Maximum size 58 mm.

## Conclusions

These observations on the distribution and taxonomy of Atyidae and Palaemonidae of Assam reveal some interesting findings. The RF of *Caridina weberi* de Man was so far known as 15-17/4. The present study shows an increase to 15-19/4. The RF of *Macrobrachium assamensis* was 9-11/3-6, also all segments hairy, but present study indicates RF 8-10/2-4 and all segments, except merus, hairy. In ealier descriptions of the first peraeopod in *M. dayanum* (Henderson), merus was described as longer than ischium, the ischium and fingers with tuft of setae. But this study shows that merus is equal to ischium, and ischium, merus, palm and fingers are all hairy.

The RF of *M. lamarrei* (H. Milne-Edwards) was reported as 7-10+1-2/4-7, it is 7-11/4-8 in the present study.

In the chelate leg, particularly in the immobile fingers, wide gaps are found between 2nd & 3rd, 3rd & 4th teeth, but in this study, the teeth are found equidistant from each other.

The rostrum of *M. birmanicum choprae* (Tiwari) was so far found to be short and nearly reaching the antennal scale, but here the rostrum is somewhat long, depending on body size, and mostly protruding in front of the body. The spinules of the second peraeopod were recorded as larger on the underside of merus and carpus, but the present observation shows the occurrence of larger spinules only on the underside of the merus.

TABLE 1

DISTRIBUTION OF THE DECAPOD CRUSTACEANS OF THE GENERA *CARIDINA* AND *MACROBRACHIUM* IN ASSAM

| Species | Goalpara | Kamrup | Darrang | Nowgaon | Karbi-Anglong | Cachar | Sibsagar | Lakhimpur | Dibrugarh |
|---|---|---|---|---|---|---|---|---|---|
| *Caridina weberi* de Man | + | + | A | + | A | A | + | A | A |
| *Macrobrachium altifrons* (Henderson) | + | + | A | A | + | A | + | A | A |
| *M. assamensis* (Tiwari) | A | + | A | A | A | + | + | + | + |
| *M. birmanicum choprae* (Tiwari) | A | + | + | A | A | + | + | + | + |
| *M. dayanum* (Henderson) | A | + | + | + | + | + | + | + | + |
| *M. lamarrei* (H. Milne-Edwards) | + | + | + | + | A | + | + | + | + |
| *M. malcolmsonii* (H. Milne-Edwards) | A | + | + | A | A | + | + | A | + |
| *M. menoni* (Agarwal) | + | + | A | A | A | + | A | A | A |
| *M. tiwari* (Agarwal) | + | + | A | A | + | A | A | A | A |

TABLE 2

A KEYTO THE IDENTIFICATION OF THE SPECIES OF THE GENUS *CARIDINA* AND *MACROBRACHIUM* STUDIED

| Character | *C. weberi* | *M. altifrons* | *M. assamensis* | *M. b. choprae* | *M. dayanum* | *M. lamarrei* | *M. malcolmsonii* | *M. menoni* | *M. tiwari* |
|---|---|---|---|---|---|---|---|---|---|
| Rostral formula | 15-19/4 | 10-12/3 | 8-10/2-4 | 11-12/4-5 | 7-11/5-9 | 7-11/4-8 | 8-11+1-3/4-7 | 15-16/7-8 | 5-7/2-5 |
| Antennal scale | pointed to sightly oval | pointed | oval | pointed | pointed | slightly oval | conical | oval | slightly oval |
| Carapace | pigmented | unpigmented | highly pigmented | slightly pigmented | highly pigmented | slightly pigmented | unpigmented | slightly pigmented | slightly pigmented |
| 1st peraeopod | carpus = chela carpus > merus | finger = ½ carpus | carpus ≥ chela carpus > merus | carpus twice the chela | merus = ischium | carpus = merus | ischium < chela | ischium = chela | carpus ≥ merus |
| 2nd peraeopod | merus = carpus carpus ≥ chela | palm ≥ finger | merus ≥ carpus | merus = carpus ≥ palm | palm ≥ finger; carpus = merus | merus > carpus | ischium < merus merus > carpus | merus < carpus | propodus ≥ merus |
| Maximum length | 24 m | 47 m | 77mm | 170 mm | 92 mm | 65 mm | 60 mm | 67 m | 58 mm |

The taxonomy of the fresh water prawns *Cardina & Macrobrachium* have been very confusing due to the great morphological plasticity of this group showing considerable intra-specific variation over shadowing the genetic affinities between related species. Considering the practical difficulties encountered in the present study, a key is prepared and given

The apex of the rostrum of *M. altifrons* (Henderson) was recorded as inclined downwards or horizontal, the convexity starting after ¼th the length from its origin and with 2 teeth on the carapace. In the present investigation, how-ever, the apex is horizontal to slightly upturned. and the convexity starts after 1/3rd the length from its origin, with 3-4 teeth on the carapace.

The RF of *M. menoni* (Agarwal) was recorded as 15/8, but the present study extends its range to 15-16/7-8. From previous records, in *M. malcolmsonii* (H. Milne-Edwards) RF was recorded as 9-11+1-2/4-7, but this study extends its range to 8-11+1-3/4-7. On the dorsal edge of the rostrum, according to previous study, convexity starts above the orbit, then gradually declines and straightens and becomes pointed at the tip; but here it is found that convexity starts behind the orbit, is maximum above the orbit, gradually declines, becomes straight and slightly upturned at the tip.

The RF of *M. tiwari* (Agarwal) was so far known as 5/5.The present study extends its range to 5-7/2-5. The palm of the second peraeopod was recorded as equal to finger, but here the palm is found to be longer than the finger. A key to the identification of the species discussed is given in Table 2.

The state of Assam can be divided into eastern and western zones, with Guwahati as the central zone. Upper Assam is the eastern zone, including Sibsagar, Lakhimpur, (Cachar is deleted as it is too far south) and Dibrugarh districts, from where large numbers of *M. dayanum, M. assamensis, M. lamarrei* and *M. birmanicum choprae* have been collected. From this collection it is assumed that such species are available both in lower and upper Assam. *M. assamensis, M. dayanum* and *M. birmanicum choprae* are also extensively recorded from Lakhimpur, where they were not previously recorded. Similarly, *M. lamarrei,* which was restricted to Kamrup and Cachar, has been extended almost uniformly over Assam covering all districts except Karbi Anglong. Goalpara and Karbi-Anglong districts were not recorded as sites for *M. altifrons* and *M. tiwarii*, hence they are new locality records. Similarly, Goalpara and Kamrup districts are new distributional localities for *M. menoni*; Cachar, Sibsagar and Dibrugarh for *M. malcolmsonii* and Kamrup, Nowgaon and Sibsagar for *Caridina weberi* respectively (Table 1).

Thus, from the previous and present studies, it is concluded that *M. dayanum* and *M. lamarrei* are extensively found in all districts and have cosmopolitan distribution in Assam, whereas other species are sparsely distributed.

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